

# GLOSERV

ADVANCES IN GLOBAL SERVICES AND RETAIL MANAGEMENT

Editors

**Dr. Cihan Cobanoglu**

**Dr. Valentina Della Corte**



***Co-Editors***

***Dr. Cihan Cobanoglu***, University of South Florida, USA

***Dr. Valentina Della Corte***, University of Naples Federico II, Italy

ADVANCES IN GLOBAL SERVICES AND RETAIL MANAGEMENT: VOLUME 2

ISBN 978-1-955833-03-5

***\*Authors are fully responsible for corrections of any typographical, copyrighted materials, technical and content errors.***

***Co-Editors***

***Dr. Cihan Cobanoglu***, University of South Florida, USA

***Dr. Valentina Della Corte***, University of Naples Federico II, Italy

**ISBN 978-1-955833-03-5**

**© USF M3 Publishing 2021**

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed. The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use. The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

*This imprint is published by USF M3 Publishing, LLC*

The registered company address is University of South Florida, 8350 N Tamiami Tr, Sarasota, FL 34243 USA.

*Associate Editor*

*Dr. Seden Dogan*, Ondokuz Mayıs University, Turkey

*Dr. Muhittin Cavusoglu*, Northern Arizona University, USA

*Assistant Editor*

*Dr. Faizan Ali*, University of South Florida, USA

*Dr. Resat Arica*, Adiyaman University, Turkey

*Dr. Alaattin Basoda*, Aksaray University, Turkey

*Dr. Lisa Cain*, Florida International University, USA

*Dr. Giovanna Del Gaudio*, University of Naples Federico II, Italy

*Dr. Rab-Nawaz Lodhi*, University of Central Punjab, Pakistan

*Dr. Bendegul Okumus*, University of Central Florida, USA

*Dr. Antonella Miletti*, University of Naples Federico II, Italy

*Dr. Gozde Turktarhan*, University of South Florida, USA

*Editor Assistants*

*Ipek Itr Can*, Anadolu University, Turkey

*Filiz Dalkilic Yilmaz*, Nevsehir Hacı Bektaş University, Turkey

*Eda Hazarhun*, Dokuz Eylül University, Turkey

*Gamze Kaya*, Mersin University, Turkey

*Oguz Kiper*, Sakarya Applied Sciences University, Turkey

*Basak Ozyurt*, Trakya University, Turkey

*Gokhan Sener*, Necmettin Erbakan University, Turkey

*\*Authors are fully responsible for corrections of any typographical, copyrighted materials, technical and content errors.*

## Artificial Intelligence in Retailing

İbrahim Kırçova, Munise Hayrun Sağlam, and Şirin Gizem Köse

Faculty of Economics and Administrative Sciences  
Yıldız Technical University, Turkey

### Abstract

Advances in Artificial Intelligence and Machine Learning technologies have brought a completely new level of data processing that provides deeper business insights. Purchasing advice, dynamic pricing, personal content and advice have become widely used in the retail industry thanks to artificial intelligence. Almost real-time results can be achieved by expanding the scope of data obtained from existing customers and algorithms that mimic human-like behavior. In addition, interactions with machines are more widely accepted than before, allowing consumers to accept innovations faster and thus increase brand loyalty. On the other hand, the success of artificial intelligence, which will change the future of humanity and retailers to a great extent, will depend on the quality of the data that interconnected devices will learn, the integration of the applications into the business processes, the correct transfer of the results to the responsible people and the use of them in harmony with the corporate goals. Retailers and customers will accept the use of artificial intelligence if they realize and experience a specific benefit for them. This article aims to provide a framework for how artificial intelligence applications are used in retail.

**Keywords:** marketing technology, machine learning, digitalization, augmented reality

**Recommended Citation:** Kircova, I., Sağlam, M. H., & Kose, S. G. (2021). Artificial intelligence in retailing. In C. Cobanoglu, & V. Della Corte (Eds.), *Advances in global services and retail management* (pp. 1–14). USF M3 Publishing. <https://www.doi.org/10.5038/9781955833035>

### Introduction

Artificial intelligence is a science that is a combination of many technologies and is currently used in many industries. This branch of science, which will continue to change our daily life, is defined as the fourth industrial revolution. We are faced with an innovative understanding of marketing that understands the psychology of the consumer, guesses about his behavior and directs him to the product he seeks, in short, that fully understands the consumer. Leading retailers such as Amazon and Alibaba are now able to provide personal advice to their customers by using algorithms operated with artificial intelligence in order to learn the needs and preferences of their customers and to serve them better based on this data. Moreover, this understanding will make life more and more easier by providing consumers with more automatic ways before and after the purchasing process.

This technology, which has been in our lives since the 1960s, has served consumers in different forms over the years. We've seen AI being incorporated into clocks, smart home systems, voice assistants, messaging platforms, and a variety of other platforms. Today, there are different artificial intelligence tools that support marketing activities in the retail sector.

Companies are aware that they must be competitive, otherwise competitors will learn innovative solutions by acting ahead of what happened. Artificial intelligence is a technology at the very beginning of its development that can meet the needs of different types of retailers in different business areas; but it is progressing rapidly. The important thing here is that businesses should be proactive and determine their vision of this technology correctly. Although there are uncertainties in all sectors at the moment, it is obvious that companies that look at artificial intelligence from the positive side, are agile and constantly learning to improve it will increase their investment profitability.

Retailers can now access data that can assist them identify who their customers are, where they shop, what they search and purchase, and how they will interact with retailers (Oh & Polidan, 2018, p.32). In this highly competitive environment, retailers must achieve accurate AI integration by getting faster and better information from the data customers leave online and offline in order to differentiate themselves from their competitors and continue to survive. As there is an increase in daily and repetitive jobs over the decades, more artificial intelligence solutions will be used. Artificial intelligence technology will evolve rapidly to support people's knowledge in making more complex decisions.

## **Literature Review**

Retailing is the sale of goods and services to the end consumer little by little through a business. The reason retail is at the center of the economy as a function: it combines the diverse needs of consumers with the special offers of manufacturers (Reinartz & Imschloss, 2019). As part of the value chain, retailing encompasses all the stakeholders and processes required to deliver an end product or service to the end customer. Direct communication with the end customer, ensuring product diversity, and the physical flow of commercial goods are among the main functions of retailing. These functions ensure the continuity of the data flow in the correct determination of what consumers want or needs for goods and services. We are entering a new era in retailing, where digital and analog retail are no longer separated by the idea of contact points, but work together harmoniously in a ubiquitous capacity (Koumbis, 2021). While the benefits of physical retailing to the value chain continue, new digital technologies have transformed marketplaces into a multi-channel structure by excluding physical merchandising, disrupting the traditional retail business model, which significantly changed the customer buying journey (Oosthuizen et al., 2020, p. 2). Retailers are now trying to offer their customers a total shopping experience both online and offline, and they also use personal social currency to help market and drive their brands and products (Koumbis, 2021). Digital technologies are transforming the way we process information, learn, make decisions and interact with each other, and no industry is immune from the resulting turbulence (Day & Schoemaker, 2019).

The rise of online and multichannel retail has increased the expectations of the average consumer (Oh & Polidan, 2018). Because now we have the ability to store and process large amounts of data; innovations in cloud computing allow companies to cheaply stock high volumes of data and use distributed computing to examine big data in near real time (Bernard & Ward, 2019). Along with the fact that technological developments reduce the cost of accessing and storing data, there has been an increase in the amount and variety of data. These changes have led retailers to data-driven strategies with real-time application to stay informed in a dynamic market (Oh & Polidan, 2018). Understanding customers better and discovering similarities in customers' behavioral

patterns will allow for more complex relationships that will increase the lifetime value of the customer. For this reason, in this sector, quality, product type, price, the place of sale and the way of displaying the product, being reliable and marketing all these variables are of great importance. Companies that can survive in this highly competitive market will be companies that are successful in dedicating the benefits of new technologies such as artificial intelligence to their business processes to reduce costs and improve customer experience.

Artificial intelligence applications have enabled the retail industry to regain strength in the face of fast-growing e-commerce applications. Data and algorithms are the key to changing business models for retailers to make accurate predictions for the future and to be prepared for the opportunities and challenges that may arise. In particular, the fact that companies in the top third of their industries are on average 5% more productive than their competitors and earn 6% more profit, demonstrating the importance of data-based decision making (McAfee & Brynjolfsson, 2012). At this point, since artificial intelligence technology is fed with data, it has caused the activities of consumers in their daily lives and retail transactions to be intertwined. Consumers distribute free data to retailers, with or without realizing it during the day. This data is collected when consumers purchase a product, browse online about that product, or talk on social media, and helps the retailer provide the customer with the service they want.

Marketing, in its simplest form, is to offer value to customers and get value from them by trying to influence demand so that the company can achieve its goals. Since the increase in demand in retailing means success and reaching goals, it is a necessity to do marketing correctly. The rapid advancement of technology makes it possible to get closer to consumers to offer more value. At this point, retailers need to take this developing technology seriously, investing in artificial intelligence solutions and rapidly adopt and implement it. In line with the unique mission and goals of each organization, artificial intelligence solutions should be used to find a solution to a well-defined problem.

Artificial intelligence systems learn by training on large data sets, so retailing provides an efficient environment for the use and growth of artificial intelligence (Shankar, 2018, p 6). With the rapid advancement of digitalization, retailers can access more data. Retailers are rapidly turning to different artificial intelligence applications in order to extract clean and accurate information from this evolving data. Here, the challenge for retailers is whether they have the data that can provide the right artificial intelligence integration. Because before retailers start developing digital marketing strategies, they must have a clear understanding of their present digital footprints (Perrey & Spillecke, 2011, p.274). At this point, there is usually no single correct answer to the question of which strategy will provide the best artificial intelligence solution or a set of artificial intelligence tools, because AI technology basically involves a trade-off: more speed, less accuracy; more autonomy, less control; more data, less privacy (Agrawal, Gans, & Goldfarb, 2018, p.7).

Artificial intelligence technology gives the user the feeling that there is someone who is next to him and gives him advice without being too intrusive to have a perfect experience in the retail process. One of the important points here is to give the consumer the confidence that they can contact a person if necessary, whenever they need them. As artificial intelligence applications become more complex in the following years, discussions on ethical issues will become more talked about.

Currently, the widely used electronic retailing business model is generally based on the customers purchasing the product of their choice and then the retailer delivering the product to the customer (Davenport et al., 2019, p.25). With artificial intelligence, digital retailers can predict highly accurately what customers will want to buy based on their past shopping experiences. With this assumption, they can move closer to the customer and move to a shipping-after-shopping business model. Therefore, retailers will be able to determine customers' preferences with artificial intelligence and prepare to ship products to customers without an order yet, and offer customers the alternative to quickly return products they do not need (Agrawal et al., 2018). This will make supply chains more efficient and help to control inventory management and logistics. This change will significantly transform marketing strategies and create new business models. Customer behavior will also alter accordingly.

### ***A Framework for Understanding How Artificial Intelligence Works***

Artificial intelligence refers to a technology that tries to imitate human intelligence, encompassing a wide range of abilities such as voice and image recognition, machine learning techniques, and semantic search. Kaplan and Haenlein use Artificial Intelligence systems Analytical (Analytical AI), cognitive intelligence and learning from past experience to apprise future choices; human-induced artificial intelligence (Human-Inspired AI) can recognize emotions at the same level as people and in the next area while making a decision; they divided them into three groups as humanized (Humanized AI), i.e. artificial intelligence, which shows the development of all kinds of cognitive, emotional and social intelligence competencies (not yet available)(Kaplan & Haenlein, 2019, pp.18-19). Considering this grouping, we can deduce that machines can have a number of competencies that include humanoid features and activities to make them intelligent, and that machines can exhibit similar and equivalent features to those of humans. Computer programs designed to do these kinds of jobs that require human intelligence mean that companies can find novel methods to interact with their customers, offer them smarter products and services, automate processes, and raises success (Bernard & Ward, 2019, s. 1).

In order to understand and talk about artificial intelligence, it is necessary to have knowledge about big data and analysis methods. It is not possible to talk about intelligence without understanding the Internet of Things (IoT), Blockchain, 5G networks and machine learning, which are the basis for the formation of artificial intelligence.

Machine learning is a concept that a computer program can learn without human intervention and adapt to different situations with new data. Machine learning includes algorithms that learn rules or patterns from the data in order to achieve the goal of minimizing a prediction error (Jansen, 2020, p.1). Algorithms represent a set of steps or rules designed to achieve a goal. Algorithmic trading is based on computer programs that execute algorithms to automate some or all elements of a trading strategy (Jansen, 2020, p.1). Machine learning keeps a computer's built-in algorithms up to date regardless of worldwide changes. Machine learning algorithms can also work on large amounts of historical data to determine which ads are performing best on which people and at what stage of the purchasing process (Pearson, 2019). On the other hand, the decisive questions for machine learning are: How can it create systems that automatically evolve with experience? Can it enable computers to decide for themselves which computational architectures and algorithms are most effective at manipulating data to achieve a specific result (Sterne, 2017)?

Deep learning offered many of the latest advances in artificial intelligence engagements, such as the ability of computers to see what or whose ability in an image or video, and ability. (Bernard & Ward, 2019). This technology has given us the ability to understand and reproduce content in a text or a user's speech that we experience in chatbots when shopping on a website called natural language processing.

The Internet of Things is a dynamic network of physical and virtual objects that includes embedded technologies for communication, intelligent thinking, and interaction with their environment. The basic idea is that RFID chips can be found anywhere with multiple networks, which can be handled separately, such as sensors and cell phones. They can communicate with each other autonomously and work together to achieve a common goal. As a result, it will bring the human factor to the background more and more using the internet, while the objects come to the fore. Far-reaching development will create revolutionary business models for companies of size in a wide variety of industries. On the other hand, on the other hand, it will become more important to integrate traditional products into a service-based business model so that the written machines can organize their own maintenance.

### ***Basic Applications of Artificial Intelligence in Retail Industry***

Although most of the AI applications for retailers have gone through more experience, its contribution to physical stores has the potential to change the department significantly. According to the 2017 PWC report, three areas where AI has the greatest potential in Retail applications (PWC, 2017, p.15):

- Personalized design and production.
- Forecasting customer demand – For example, retailers are starting to use deep learning to anticipate their orders.
- Inventory and loading management.

AI uses this data to predict future purchasing behavior of customers as it collects data points that help understand how the target audience uses the product and interacts with the brand. Based on these data, it can be predicted which customer is more loyal to the business or who is most likely to leave the business. By analyzing historical data, customers' reaction to current trends or seasonal-periodic events can be predicted in advance. With these capabilities, the demand forecasts of marketing teams for popular products will improve, unprofitable customers will be identified and effective strategies can be developed for all of these. (Oh & Polidan, 2018, p.33).

In order to remain competitive in retailing, price, logistics and transportation as well as the product range are decisive. The smart, customer-oriented product range offers customers an attractive shopping experience. The requested product must be available and placed in the right quantity and at the right price where the customer is looking. In this context, computer systems using artificial intelligence processes can quickly capture complex relationships and make decisions, as well as evaluate and optimize the current situation. For example, product ranges can be optimally and dynamically adapted through pattern recognition from a large number of data and determination of the causality between them (for example, customers' purchasing behavior and external influences such as events, weather and trends). In addition, by capturing the effects and consequences of a product-related decision (color, size, style, etc.), the AI system can create better

models for future decisions and use predictive analysis, such as time series analysis, to make increasingly better predictions about future product line decisions based on historical data.

### *Personalization*

Personalization is defined as “continually tailoring the shopping experience to individual customers using a combination of first-party customer data a company collects from its customers or third-party customer data collected by external organizations that do not have original data sources” (BCG, 2019, p.5). Thanks to personalized communication efforts, sales volume increases and new customers are attracted. According to research by BCG, when the shopping experience is highly personalized, customers are 110% more likely to add extra items to their baskets and 40% more likely to spend than they intended (BCG, 2019, p. 5).

Artificial intelligence solutions use personalized data to gather insights about similarities in customer preferences by collecting online and offline data about customers. Artificial intelligence can be used to find patterns in customer behavior by pulling this information from clickstream data, consumer purchase history, demographic data, and preferences that lead to the best product recommendations for each consumer. Intelligent image processing solutions can increase the sales success of retail stores and products. For example, smart systems are placed on digital screens in the sales area. With the help of image records used to analyze and evaluate various parameters (exposure, time to look at specific shelves, duration and mood of the decision-making process for purchasing), advertising and interaction with customers can be customized (BMW, 2020, p.14). Therefore, it is also possible to provide personalized offers or similar products to positively influence the purchasing decision. By connecting several devices, they learn from each other as well, optimizing customer experience and sales effectiveness. The personalization application based on integrated devices allows retailers to create offers, incentives and a positive shopping experience that appeal to the target audience. However, sensors can identify customers using mobile applications in the store and highlight the products that these customers may be interested in based on their purchasing history (Deloitte, 2020, p.9).

### *AI Generated Content*

Although the science of artificial intelligence has not reached the level of writing an opinion paper yet, with the support of artificial intelligence, it can create a valuable resonant content that will help attract customers to the site. Artificial intelligence content programs can select principles from a data set for a specific purpose and organize a 'human voice' article (Seligman, 2017, p.21). So artificial intelligence can yet write data content. Its main goal at this point is to attract audiences to the site.

Based on machine learning, this application feeds on online data to provide automated content generation, which is very helpful for formatting notification-based content or product descriptions. Artificial intelligence is able to choose the most compelling news headline, evaluate the words that increase traffic flow, and provide a future projection about this data (Seligman, 2017).

### *Retail Service Robots*

Although technology constantly affects customer service experiences, humanoid robots are considered as the most significant developments in the service area (Mende et al., 2019, p.536). Interactive humanoid robots at different stages of the retail value chain can deliver a unique customer experience. On the basis of increasing customer satisfaction, minimizing negative experiences in the store, zero-defect logistics, product collection and delivery, and customer path observation and analysis can play a game-changer role in each of these areas of operation (Mondal, 2017, p.1). Service robots are defined as “system-based autonomous and adaptable interfaces that interact, communicate and deliver service to an organization's customers.” (Wirtz et al., 2018, s. 4). This new competitive technology aims to improve the service experience of companies by establishing more positive interactions with their customers. Meets, provides product information and even guides customers, so that more and more accurate information can be collected by communicating face-to-face with customers. According to the International Federation of Robotics World Robotics 2019 Service Robots report, sales of public relations robots in 2018 were 53% compared to 2017. Increased and an estimated 7,000 units were sold (IFR, 2019). Between 2019 and 2021, about 40,500 units will be sold, representing a 37% compound annual growth rate (IFR, 2019).

The most common use of robots in retail was behind the scenes, to increase efficiency in inventory management by automating routine and repetitive processes in warehouse and logistics activities, and thus to turn towards more valuable businesses by saving costs. Service is to use it as a data collector in a complex network of connected devices, objects and sensors that collects comprehensive data analyzed in the cloud or with edge computing (Forgan, 2020). The sensor attributes try to analyze the number of customers, tracking, behavior, attention span and emotions. On the other hand, customers want the way of the store, the things they want to discover in the store, customization and personalization, when they want to shop, and their products under their own control (Kaur et al., 2020, p.2). The customer scoring system detects unsatisfied customers and utilizes their feedback to fix the problems. These technologies are based on automation, which can be seen as a physical substitute for human labor in a broader sense.

Retailers use virtual reality robots to capture the attention of consumers and provide an immersive and quality experience. At this point, IKEA offers its customers catalogs supported with augmented reality and innovations that make it easier for customers to get ideas without purchasing by placing products in 3D model rooms. (Mondal, 2017, p.4). Another example is Lowe's Innovation Labs (lowesinnovationlabs.com), which uses a humanoid SR "LoweBot" to help employees track inventory and help customers find products in the store (Pantano, 2020 p.16). Yet for now, service robots are not adequately skilled enough in interacting with humans and navigating hotels, restaurants, and airports (Ivanov, 2019, p.). However, robots weren't advanced enough to perform many of the tasks they wanted them to do. Recently developed Emovu software track and examine shoppers' emotions and loyalty levels as they pass through a store (Mondal, 2017, p.4).

### *Chatbots*

Chatbot technology is a part of artificial intelligence that provides human-machine interaction based on natural language. Chatbots are defined by Shawar and Atwell as "Chatbots are computer

programs that interact with users using natural languages" (Shawar & Atwell, 2007, p. 29). Chatbots conduct a conversation in natural language through auditory or textual methods, understand the purpose of the user and send responses according to the organization's business rules and data (Spychalska, 2019, s. 256-257), learn by imitating human behavior, and develop communication skills with repetitive experiences. Chatbots are advantageous for retailers in terms of customer service (about 95%), sales / marketing (about 55%) and order processing (about 48%) (Mindbrowser, 2017).

A chatbot can be developed by a development team or using a platform. If an in-house chatbot is developed, several criteria should be considered. For example, customers' needs should be included in the development of the architecture, process model for development, functions, implementation, testing, and related runtime environment. Will the chatbot be implemented on the company's home page or should the chatbot interact with customers through a messenger service application such as Facebook Messenger? Companies have to deal with these questions thematically in the development process. Platforms on the Internet offer an alternative to in-house development. These provide all the resources and services needed to build a chatbot such as database, software, natural language processing, and other features.

AI-based chatbots provide a more efficient customer experience, improve search, send notifications about new products, and recommend products that are similar to customers' preferences. It represents a new way for brands, businesses, and publishers to interact with users without the need to download any other custom app they need to be familiar with, or it is regularly configured and updated as a pre-installed messaging app is used (Koumaras et al., 2018, p.1). Therefore, it provides lower costs in developing communication channels in electronic retailing. The most important thing here is that chatbots help to communicate directly with customers. With the use of chatbots, companies that aim to deliver effective and precise information to end users and want to avoid errors caused by employees' repeated acquisition of information achieve exactly this goal. The current problem is to improve understanding between man and machine. While the chatbot improves the knowledge of how to personalize a message and improve its own protocols and responses (Spychalska, 2019, p. 256-257), typos or neglected questions from customers can lead to error messages. Additionally, chatbots will not replace full-fledged customer service in the near future, but instead will continue to improve the customer experience as a kind of additional service to digital services.

#### *Augmented Reality-AR / Virtual Reality-VR*

Augmented reality and virtual reality are called consumer-facing technologies because they are technologies and / or devices that the consumer interacts and experiences directly while in the physical store or while browsing the online store (Boardman & Henninger, 2020). Providing an optimal shopping experience is generally one of the main goals of a digital retailer. Consumers say they do not have as rich experience with e-retail as they do with physical stores that include versatile interactions with products, stores, and salespeople (Alcañiz, 2019). Augmented reality technology using devices such as smartphones or tablets, wearable devices such as headsets, projectors or fixed interactive displays enables consumers to interact with virtual products in an innovative way (Bonetti et al., 2018).

Through interactive technologies and digital simulative technologies such as Augmented Reality technology, online retail establishes a positive connection psychologically by shaping the brand and customer relationship. The information obtained with the help of technology is scripted and placed in the message content to be used in communication and interaction is provided.

Virtual reality is a technology that enables users to interact with the objects in this environment by making the 3D images designed on the computer feel like they are in the real environment with interconnected technological devices. In the future, in-store robots will serve customers, as well as moving trial booths to virtual reality glasses, and even touch screen digitized store environments where customers can track on smartphones will change retailing. Nike launched an artificial intelligence-based system in 2017 that allows customers to design their own sneakers using Augmented Reality and projection methods (Moreno 2019). After collecting data from customers' past preferences, it was developed with machine learning algorithms to differentiate product design and influence customers by sending them special product offers, campaigns and messages, and increase loyalty.

### *Dynamic Pricing*

Thanks to the use of technology such as artificial intelligence and face recognition, the retailers grow the profit-making customer segment by offering personalized prices and promotions by recognizing the customer, and develops its focus in accordance with this profit-return rate rating input. Dynamic pricing algorithms enable retailers to determine how much consumers will pay for a particular product and change prices in real time by analyzing competitive product and store prices, consumer behavior, location, time and seasonal factors in line with ever-changing market conditions. This would also affect individual prices per customer, depending on interests or other factors. Scenarios where such pricing is possible can be considered. Pricing strategies can be adapted to temporary states of mind ("good / bad mood", sadness, stress ...), especially if facial recognition continues to improve through AI-based programs (BVDW, 2018).

Dynamic pricing is a pricing strategy that requires frequent changes to competitors. Discounts are one way to increase sales; the problem is that customers who pay full price pay less, which means less profit. Dynamic pricing solves this problem by sending discounts to customers who need it to make a purchasing decision using machine learning. Machine learning creates a trend pattern that shows a customer needs a quote to transform and is likely to transform without the need for a quote. In this way, sales can be increased before profit margins are lowered too much and thus profits can be maximized.

### *Logistics, Shipping and Delivery Management*

Purchasing behaviors are no longer driven via mobile devices or taken in a fixed store area, so logistics in the sales process is becoming increasingly relevant due to digitalization. Here, the use of artificial intelligence can develop a strong leverage effect as it reduces shipping costs through intelligent learning systems.

Options such as driverless vehicles that emerged as a result of artificial intelligence, robots used in storage and shelves, and smart route planning both minimize the errors that may occur in the logistics process and provide convenience. Amazon has taken the important step in using drones

in retail, operating drones and is following drone laws around the world to bring drone deliveries into service in the near future (Shankar, 2018). Thanks to artificial intelligence algorithms, a change that may occur at any stage of the supply chain related to product features can be closely monitored and intervened, and all logistics operations can be improved in this way. Sellers can post their shipments on a portal, and the AI sets a price for the shipment that corresponds to the actual price of the shipping day. In this way, price determining factors such as weather and traffic can be estimated more optimally and thus a price compatible with the market can be determined.

### *Personnel Planning*

Retailers, customer buying behavior, weather, upcoming events, etc. They can use artificial intelligence technologies for smart personnel planning by calculating personnel requirements based on external effects such as, and creating shift schedules accordingly. This prevents more employees from being over-commissioned, resulting in higher costs or not enough workers in the field. As a result, matters such as customer service or delivery are best handled, can increase rational staffing and efficiency.

### **Conclusion**

Artificial intelligence is changing relationships with retailers by helping shoppers and consumers make decisions. First of all, AI technology provides more accurate information about customers and their needs in retail, which improves recommendations, increases the relevance of search results, or is used in personalized service. Soon, robots will go further than tracking changes in inventory level and checking price changes to ensure accuracy and reliability. (Forgan, 2020).

Chatbots, driverless cars, and networked machines in digital factories give us a glimpse of what our future will look like. The use of artificial intelligence offers companies many advantages, such as higher efficiency, less repetitive tasks, and better customer service. However, if it falls into the wrong hands, potential dangers can soon have more severe consequences for society than the great benefits. The ubiquitous network is classified against malicious attacks or technical malfunctions, which can lead to widespread malfunctions and huge losses. As responsibility for actions is transferred from people, companies are also faced with new responsibility. The fundamental question for the success of artificial intelligence in the retail industry will ultimately be for what application areas it will be used for. At its most fundamental, AI is used by retailers and brands to achieve a more personal, efficient and faster level of service for customers.

Even medium-sized and small companies (SMEs) will be forced to use artificial intelligence systems within the scope of their possibilities and business models in order to survive in the market. Currently, AI is driven primarily by very large, multinational players. It is important to constantly build up knowledge and deal with new possibilities, especially due to the lack of knowledge and know-how transfer and increasingly rapidly emerging opportunities. Because, on the other hand, there is almost no concrete application knowledge.

Inefficiencies caused by the inability to adapt to the changing competitive environment leave traditional retailers vulnerable to the forces of new electronic retailers. In order to maintain competitiveness and to continue in the ever-changing market where customer needs and

expectations differ, retailers need to be leaner, more flexible, more agile and adapt to new technologies rapidly and renew their retail processes.

### ***Implications for Practice and Society***

At the beginning of the research on artificial intelligence technology, machines were developed to imitate human actions. It is obvious that it is difficult to build robots that "think" without fully understanding human thought. According to the findings, AI will be superior to humans in many fields of activity in the near future, including cross-language translation, writing high school essays, driving trucks, retail industry, writing bestsellers, and working as a surgeon (King, 2019). Therefore, the development of artificial intelligence now includes not only information technologies, but also sociology, neurology, psychology, and even philosophy. Artificial intelligence technology must be programmed into the DNA of all ethical self-learning algorithms to meet the ethical demands of society.

The main benefits of AI technology for society today are that it helps improve healthcare, make cars and other modes of transport safer, manage the global economy, and deliver customized, cheaper and more durable products and services to the market. Access to information as well as general and vocational education can be facilitated through the use of pedestrian intelligence - in terms of distance education and further education, this aspect is already of particular importance in the context of the Covid 19 outbreak. Artificial intelligence can contribute to job safety, for example by using robots for dangerous work steps, or it can also be used to assist elderly patients or surgeons. Discussions on the political use of artificial intelligence often revolve around negative effects on political rights and implications for society itself. Over time, the economy and society will be secured for the protection of rights through digital change. However, in order to take full advantage of the social benefits of the described artificial intelligence systems, we must first not trust this technology.

As industries using artificial intelligence grow and evolve, new employment opportunities will be created for society and business lines will need to be redefined. Even today, so-called "weak" AI applications can perform specific tasks such as text recognition. In the future, "powerful" artificial intelligence applications will bring huge benefits by being able to control autonomous vehicles, make more accurate weather forecasts, diagnose diseases, perform financial transactions, or serve the community by operating and monitoring industrial machines.

In today's era of automation, societies use algorithms to make complex decisions based on a data set that humans cannot grasp. In the field of autonomous driving or medicine, critical decision-making areas are driven by machines in a very short time, and some of them produce questionable results. However, the question arises of how decisions that are automatically generated are handled, for example when it comes to life and death, and how to ensure compliance with the law, ethical and moral standards. The study conducted by Gao et al. Using social listening method to evaluate the perception and attitudes of the public on artificial intelligence in 2020 concluded that social events can easily attract the attention of the public to artificial intelligence used in the field of medicine, and that older adults, men and people living in richer regions are more interested in this situation. (Gao et.al, 2020). Again, according to the study in question, most of the people's attitudes towards the use of artificial intelligence in the medical field are positive and they believe

that their doctors working with artificial intelligence algorithms will replace human doctors wholly or partially.

In the field of mobility, high expectations are placed on artificial intelligence applications in the society. Self-driving cars should eliminate human error as the main cause of accidents, and artificial intelligence in traffic control systems should better control the flow of traffic. Since many traffic accidents are the result of human error, it is estimated that the acceptance of self-driving cars by the society will generally cut the number of deaths in car accidents by about half, which corresponds to approximately 40,000 each year in the USA alone (Rossi, 2016: 2). However, it is still largely unclear what ethical principles autonomous vehicles should follow in dilemma situations where the health and life of other road users are at stake.

Artificial intelligence offers three basic ethical interests on society: privacy and surveillance, prejudice and discrimination, and the role of human judgment (Pazzanese, 2020). These ethical areas are related to the concerns of AI over the society such as privacy concerns, layoffs, loss of judgment ability as more work is transferred to more machines. Undoubtedly, the biggest concern of society against artificial intelligence technology is the danger of losing the profession.

AI-powered software can, on the one hand, reduce cyber risk for companies through better detection of attacks, but on the other hand, similar attacks facilitate because planning and implementation becomes easier. The same hacker attack - or a programming error - can be replicated on multiple computers.

To be able to use the advantages of artificial intelligence responsibly, programmers and technology providers must ensure that the decision-making processes of algorithms are traceable. If self-learning and self-judging technologies are used in business, industry and government agencies, they should be measured against the same standards as their human counterparts (Puljic, 2019).

As advances in artificial intelligence technology become more useful over time, mental activities such as analysis, thinking, and decision-making will be transferred to it more (King, 2020). This will lead to major changes in human behavior over time, and great differences will occur in society's ability to solve problems and work with others. As a result, the problem of making AI output methods understandable and explicit, or at least interpretable, can be overcome by using the interdisciplinary discovery method for society; in this way, artificial intelligence will be accessible to the society (Elhoseny, Shankar, & Abdel-Basset 2021, 16).

## References

- Agrawal, A., Gans, J. S., & Goldfarb, A. (2018). *Prediction machines: The simple economics of artificial intelligence*. Harvard Business School Press.
- Abraham, M., Van Kerckhove, J. F. Rob Archacki, Gonzálezand, J. E., & Fanfarillo, S. *The Next Level of Personalization in Retail*. (2019). Retrieved from [https://image-src.bcg.com/Images/BCG-The-Next-Level-of-Personalization-in-Retail-June-2019-R\\_tcm9-221168.pdf](https://image-src.bcg.com/Images/BCG-The-Next-Level-of-Personalization-in-Retail-June-2019-R_tcm9-221168.pdf)
- Pearson, A. (2020). Personalisation the artificial intelligence way. *Journal of Digital & Social Media Marketing*, 7(3), 245-269.
- Shawar, B. A., & Atwell, E. (2007). Chatbots: are they really useful? *LDV-Forum*, 22(1), 29-49.
- Forgan, B. *What robots can do for retail*. (2020). Retrieved from <https://hbr.org/2020/10/what-robots-can-do-for-retail>

- BMW. Anwendungen von Künstlicher Intelligenz im Einzelhandel. (2020). Retrieved from [https://www.bmw.de/Redaktion/DE/Downloads/A/anwendungen-von-kuenstlicher-intelligenz-einzelhandel.pdf?\\_\\_blob=publicationFile&v=6](https://www.bmw.de/Redaktion/DE/Downloads/A/anwendungen-von-kuenstlicher-intelligenz-einzelhandel.pdf?__blob=publicationFile&v=6)
- Bonetti, F., Warnaby, G., & Quinn, L. (2018). Augmented reality and virtual reality in physical and online retailing: A review, synthesis and research agenda. In T. Jung and M. tom Dieck (Eds.), *In augmented reality and virtual reality* (pp. 119-132). Cham, BA: Springer.
- Müller, C. Market for professional and domestic service robots booms in 2018. (2019). Retrieved from <https://ifr.org/post/market-for-professional-and-domestic-service-robots-booms-in-2018>
- Deloitte. The age of with: Leveraging AI to connect the retail enterprise of the future. (2020). Retrieved from <https://www2.deloitte.com/content/dam/Deloitte/ca/Documents/consumer-industrial-products/ca-deloitte-ai-consumer-pov-aoda-en.pdf>
- Koumbis D. (2021). *An Introduction to Fashion Retailing: From Managing to Merchandising (Basics Fashion Management)*. (2nd ed.). New York, NY: Bloomsbury.
- Spychalska, D. K. (Ed.). (2019). How chatbots influence marketing. *Management*, 23(1), 251-270. DOI: <https://doi.org/10.2478/manment-2019-0015>
- Lakhwani, K., Gianey, H. K., Wireko, J. K., & Hiran, K. K. (2020). *Internet of Things (IoT): Principles, Paradigms and Applications of IoT* (1st ed.). Daryaganj, ND: BPB.
- Pantano, E. (Ed.). (2020). *Retail Futures: The Good, the Bad and the Ugly of the Digital Transformation*, Bingley, UK: Emerald Group Publishing.
- Day, G. S., & Schoemaker, P. J. H. (2019). *See sooner act faster: How vigilant leaders thrive in an era of digital turbulence*, Cambridge, MA: The MIT Press.
- Oh, H., & Polidan, M. (2018). Retail Consulting Class: Experiential Learning Platform to Develop Future Retail Talents. *Journal of Marketing Education*. 40(1), 31-46. <https://doi.org/10.1177/0273475317743015>
- Kaplan, A., & Haenlein, M. (2019). Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Business Horizons*, 62(1), 15-25. <https://doi.org/10.1016/j.bushor.2018.08.004>
- Oosthuizen, K., Botha, E., Robertson, J., & Montecchi, M. (2020). Artificial intelligence in retail: The AI-enabled value chain, *Australasian Marketing Journal (AMJ)*, 1-10. <https://doi.org/10.1016/j.ausmj.2020.07.007>
- Koumaras, V., Foteas, A., Kapari, M., Sakkas, C., Koumaras, H. (2018). 5G performance testing of mobile chatbot applications. In: *2018 IEEE 23rd International Workshop on Computer Aided Modeling and Design of Communication Links and Networks (CAMAD)*, 1-6. DOI: 10.1109/CAMAD.2018.8515004
- Moreno, L. 10 Impressive examples of AI in marketing. (2019). *Social Media Strategies Summit*. Retrieved from <https://blog.socialmediastrategiessummit.com/10-examples-of-ai-in-marketing/#:~:text=In%202017%2C%20Nike%20launched%20a,their%20own%20graphics%20and%20colors>
- Alcañiz, M., Bigné, E., & Guixeres, J. (2019). Virtual Reality in Marketing: A Framework, Review, and Research Agenda. *Frontiers of Psychology*, 10(1530), 1-15. <https://doi.org/10.3389/fpsyg.2019.01530>
- Bernard, M., & Ward, M. (2019). *Artificial intelligence in practice: How 50 successful companies used ai and machine learning to solve problems*. Chichester, WS: Wiley.
- Mende, M., Scott, M. L., van Doorn, J., Grewal D., & Shanks, I. (2019). Service Robots Rising: How Humanoid Robots Influence Service Experiences and Elicit Compensatory Consumer Responses. *Journal of Marketing Research*, 56(4), 535-556. DOI: 10.1177/0022243718822827
- McAfee, A., & Brynjolfsson, E., (2012). Big data: The management revolution. *Harvard Business Review*, 90(10), 60-68.
- Mindbrowser. Chatbot Survey 2017. (2017). Retrieved from <https://www.mindbrowser.com/chatbot-market-survey-2017/>
- Perrey, J., & Spillecke, D. (2011). *Retail marketing and branding: A definitive guide to maximizing ROI*. (2nd ed). Chichester, WS: John Wiley.
- PricewaterhouseCoopers. Sizing the prize: What's the real value of AI for your business and how you can capitalize? (2017). Retrieved from <https://www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report.pdf>, s.1-27.
- Boardman, R., & Henninger, C. (2020). Technology-Driven Sustainability. In Vignali G., Reid, L. F., (Eds.), *Augmented reality and virtual reality: New drivers for fashion retail* (pp. 1-17). Cham, BA: Palgrave Macmillan.
- Seligman, J. (2020). *Artificial Intelligence / Machine Learning In Marketing*. Hampshire, EN: McGraw-Hill.

- Artificial intelligence and life in 2030. (2016). Retrieved from [https://ai100.stanford.edu/sites/g/files/sbiybj9861/f/ai\\_100\\_report\\_0831fnl.pdf](https://ai100.stanford.edu/sites/g/files/sbiybj9861/f/ai_100_report_0831fnl.pdf)
- Ivanov, S., & Webster, C. (Ed.). (2019). *Robots, artificial intelligence and service automation in travel, tourism and hospitality*. Bingley, UK: Emerald.
- Jansen, S. (2020). *Machine learning for algorithmic trading: Predictive models to extract signals from market and alternative data for systematic trading strategies with Python*. (2nd ed.), Birmingham, UK: Packt.
- Sterne, J. (2017). *Artificial intelligence for marketing: Practical applications*. (1st ed.). Hoboken, NJ: Wiley.
- Mondal, T. *Robots in retail: Driving innovation one aisle at a time*. (2017). Retrieved from <https://www.wns.com/insights/articles/articledetail/515/robots-in-retail-driving-innovation-one-aisle-at-a-time>
- Davenport, T., Guha, A., Grewal D., & Bressgott, T. (2020). How artificial intelligence will change the future of marketing. *Journal of the Academy of Marketing Science*, 48(1), 24-42. DOI: 10.1007/s11747-019-00696-0
- Venkatesh Shankar, V. (2018). How artificial Intelligence (AI) is reshaping retailing. *Journal of Retailing*, 94(4), 6-11. DOI:10.1016/S0022-4359(18)30076-9
- Kaur, V., Khullar, V., & Verma, N. (2020). Review of artificial intelligence with retailing sector. *Journal of Computer Science Research*, 2(1), 1-7. DOI: 10.30564/jcsr.v2i1.1591
- Reinartz W., Wiegand N., & Imschloss, M. (2019). The impact of digital transformation on the retailing value chain. *International Journal of Research in Marketing*. 36(3), 350-366. <https://doi.org/10.1016/j.ijresmar.2018.12.002>
- BVDW. *Künstliche Intelligenz im Handel – Vom professional butler zur DSGVO*. (n.d.). Retrieved from [https://www.bvdw.org/fileadmin/user\\_upload/BVDW\\_KI\\_Paper\\_Handel.pdf](https://www.bvdw.org/fileadmin/user_upload/BVDW_KI_Paper_Handel.pdf)
- King, K. (2019). *Using artificial intelligence in marketing: How to harness AI and maintain the competitive edge*, New York, NY: Kogan Page.
- Puljic, S. *Künstliche Intelligenz braucht soziale Kompetenzen*. (2019). Retrieved from <https://www.digitalbusiness-cloud.de/kuenstliche-intelligenz-braucht-soziale-kompetenzen/>
- Gao, S., He, L., Chen, Y., Li, D., & Lai, K. (2020). Public perception of artificial intelligence in medical care: Content analysis of social media. *Journal of Medical Internet Research*, 22(7), 1-11. DOI: 10.2196/16649
- Elhoseny, M., Shankar, K., & Abdel-Basset, M. (Eds.). (2021). *Artificial intelligence applications for smart societies: Recent advances*, (1st ed.). Switzerland, SW: Springer.
- Rossi, F. *Artificial Intelligence: Potential benefits and ethical considerations*. (2016). Retrieved from [https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/571380/IPOL\\_BRI\(2016\)571380\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/571380/IPOL_BRI(2016)571380_EN.pdf)
- Pazzanese, C. *Ethical concerns mount as AI takes bigger decision-making role in more industries*. (2020). Retrieved from <https://news.harvard.edu/gazette/story/2020/10/ethical-concerns-mount-as-ai-takes-bigger-decision-making-role/#:~:text=AI%20presents%20three%20major%20areas,political%20implications%20of%20new%20technologies>.
- Wirtz J., Patterson, P. G., Kunz, W. H., Gruber, T., Martins, A., Paluch, S., & Lu, L. V. (2018). Brave new world: Service robots in the frontline. *Journal of Service Management*. (29)5, 907-931. DOI 10.1108/JOSM-04-2018-0119